

KÁLMÁN TÓT



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RESEARCH AREA

My research focuses on the neural mechanisms of associative and multisensory learning in healthy and clinical populations, using a biomarker-oriented approach. My work primarily involves human EEG studies, which are combined with behavioral learning paradigms and data-driven analytical methods. The main goal of my research is to identify neurophysiological patterns associated with learning performance and cognitive functioning. In parallel, I investigate cognitive functions and learning processes in space neuroscience using behavioral approaches. In addition, I perform *in vivo* electrophysiological recordings at unit and local field potential (LFP) levels in animal models to study multisensory integration within subcortical circuits, including the basal ganglia and superior colliculus. My work aims to bridge cognitive neuroscience, systems-level electrophysiology, and applied research directions

TECHNIQUES AVAILABLE IN THE LAB

During the mentoring process, students can become familiar with the fundamentals of human EEG recordings, experimental design, and the processing of behavioral data. They will gain insight into EEG signal preprocessing, time- and frequency-domain analyses, and the statistical interpretation of results. In addition, they can acquire basic knowledge of EEG-based functional connectivity analysis and further develop their data handling, Python-based analysis, and scientific thinking skills.

SELECTED PUBLICATIONS

Tót, K., Eördegh, G., Harcsa-Pintér, N., Papp, A., Bodosi, B., Braunitzer, G., Tajti, J., Csáti, A., & Nagy, A. (2025). Impact of visual stimulus complexity on associative learning and associated reaction times in migraine patients. *Sci Rep* **15**(1): 14001.

Tót, K., Harcsa-Pintér, N., Papp, A., Bodosi, B., Nagy, A., & Eördegh, G. (2025). The Combined Effect of Visual Stimulus Complexity and Semantic Content on Audiovisual Associative Equivalence Learning. *Brain Behav* **15**(9): e70902.

Kiss, Á., **Tót, K.,** Harcsa-Pintér, N., Juhász, Z., Eördegh, G., Nagy, A., & Kelemen, A. (2025). Machine learning analysis of cortical activity in visual associative learning tasks with differing stimulus complexity. *Physiol Int* **112**(1): 40–55.

Tót, K., Eördegh, G., Harcsa-Pintér, N., Bodosi, B., Kéri, S., Kiss, Á., Kelemen, A., Braunitzer, G., & Nagy, A. (2025). Simplified Visual Stimuli Impair Retrieval and Transfer in Audiovisual Equivalence Learning Tasks. *Brain Behav* **15**(2): e70339.

Nyujtó, D., Kiss, Á., Bodosi, B., Eördegh, G., **Tót, K.,** Kelemen, A., & Nagy, A. (2024). Visually evoked local field potential changes in the caudate nucleus are remarkably more frequent in awake, behaving cats than in anaesthetized animals. *Physiol Int* **111**(1): 47–62.

Tót, K., Braunitzer, G., Harcsa-Pintér, N., Kiss, Á., Bodosi, B., Tajti, J., Csáti, A., Eördegh, G., & Nagy, A. (2024). Enhanced audiovisual associative pair learning in migraine without aura in adult patients: An unexpected finding. *Cephalgia* **44**(7): 3331024241258722.

Kiss, Á., Huszár, O. M., Bodosi, B., Eördegh, G., **Tót, K.,** Nagy, A., & Kelemen, A. (2023). Automated preprocessing of 64 channel electroencephalograms recorded by biosemi instruments. *MethodsX* **11**: 102378.